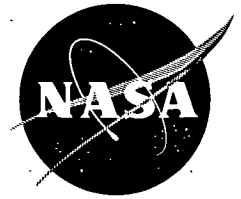
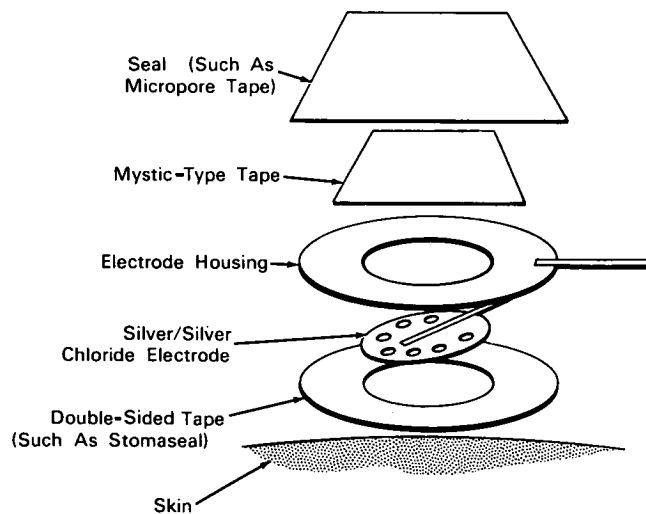


NASA TECH BRIEF



This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the NASA space program.

Improved Electrode Gives High-Quality Biological Recordings



The problem: Obtaining high-quality waveforms, such as those registered by electrocardiographs (EKG), electroencephalographs, or impedance pneumographs when the subject is engaged in considerable physical activity. Researchers making biological recordings have found that the electrode is the weakest link in the recording process and every effort must be made to reduce spurious signals. Silver/silver chloride electrodes are the most suitable for biological recording because of their stability, low potential, and ruggedness. Most electrode attachment systems, however, either permit transient signals through intermittent contact with the skin, or limit the freedom of action of the subject.

The solution: An improved electrode assembly which consists of a cup containing an electrically-conductive paste and a silver electrode plate. The paste maintains continuous contact with both the subject's skin and the silver electrode plate, and causes much

less skin irritation than other preparations commonly used for this purpose.

How it's done: The electrode assembly consists of a silicone rubber cap which holds a perforated silver disk that has been prepared as a silver/silver chloride reversible sensor. Improvement in the electrical conduction between the electrode and the skin is effected by the addition of a paste which is a 10-times isotonic concentration of Ringers' physiological solution, thickened with a soluble resin.

Silver/silver chloride electrodes can be made by soldering a wire to a silver disk and then covering the solder joint with a synthetic-rubber adhesive to prevent electrolytic action. After careful cleaning the disk is anodized in 0.1 N HCl for 20 minutes at no more than 3 milliamperes per square centimeter from a 6-volt battery. A test conducted in 1 N NaCl should register a potential between electrode sets of less than 1 millivolt.

(continued overleaf)

Electrodes are attached to the subject's skin by double-sided tape. Care is taken to ensure that the electrode assembly is completely filled with paste and properly sealed.

Notes:

1. This innovation is useful to the medical profession or to biological researchers who require high-quality electrocardiogram waveforms, or other kinds of biological recording. It is best suited to tests where the subject must be physically active. This type of electrode assembly has remained in place on a subject for periods as long as 96 hours. The subject engaged in normal activities, including baseball and showers during this time.

2. For further information about this innovation inquiries may be directed to:

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Reference: B64-10025

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA Headquarters, Washington, D.C. 20546.

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